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Douglas-fir Tussock Moth Monitoring in Southern Idaho, 1989

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ABSTRACT

Results of a 1989 Douglas-fir tussock moth (*Orgyia pseudotsugata* (McD.)) survey indicate populations of the insect have declined to low levels at all trapping sites in southern Idaho except Dewey Peak in the Owyhee Mountains and Little Water Gulch in the Sawtooth National Forest. Defoliation was not noted in southern Idaho in 1989; however, visible defoliation in the Owyhee Mountains may occur in 1990.

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INTRODUCTION

Population outbreaks of the Douglas-fir tussock moth, *Orgyia pseudotsugata* (McD.), occur cyclicly throughout the interior forests of the West (Brookes et al. 1979). Typically during an outbreak, populations increase rapidly, peak, and decline within a 3- to 4- year period. Larvae preferentially feed on new foliage but will consume older foliage when populations are very large. Douglas-fir, grand fir, and to a lesser extent subalpine fir can be severely defoliated resulting in growth reduction, top-kill, and tree mortality.

An early detection survey, utilizing sampling methods designed to detect population increases 1 to 2 years prior to an outbreak, has been employed operationally in southern Idaho since 1981. This report documents the results of the 1989 early detection survey.

METHODS

The early detection survey includes deployment of pheromone-baited traps to detect male moths and larval surveys, at sites where trap catches the preceding year exceeded 40 moths per trap (Sower, personal communication), to detect and quantify low or suboutbreak populations. Early detection survey data from 1982 to 1988 exist for 20 permanent sampling sites (Weatherby and Halsey 1988); therefore, these sites were again used as sampling sites for 1989. At each sampling site, five pheromone-baited traps were deployed following the procedures outlined by Daterman et al. (1979). Additionally, based upon the results of the 1988 catch, pheromone-baited trapping was intensified at 2 sites—the Dewey Peak site on the Bureau of Land Management lands in the Owyhee Mountains and the Sharps Canyon site on Idaho State Lands near Bellevue—where the 1988 catch exceeded 25 moths per trap. The rationale supporting the selection of this 25-moth threshold has been explained by Thier (1987). At these sites, two additional sets of five traps each were deployed in similar stands located within 1 mile of the original site. For each set of traps at each site, we recorded the number of male moths captured within each trap and then calculated the mean moth catch per trap for each set.

Larval sampling, using sequential sampling procedures (Mason 1979), was conducted at the Dewey Peak and Sharps Canyon sites. The 1988 mean trap catch was 36.4 and 47 moths, respectively, at each site. The cumulative number of small larvae recovered at each site was recorded and used to quantify the population.

For the past 3 years, we have evaluated an additional monitoring method developed cooperatively by the USDA Forest Service, Region 5, Forest Pest Management and the University of California to sample the population seeking pupation sites. This method involves selecting 10 host trees within each trapping site and nailing 2 cryptic shelters to opposite sides of the bole of each tree. Data collected included the total number of pupae per shelter, their sex, and the condition of each pupa—either healthy, parasitized, or dead from unknown causes. Data for all 3 years were analyzed using Number Cruncher Statistical System (Hintz 1987).

Table 1 lists the locations of the original 20 sampling sites, the sampling method used at each site, and the sampling dates.

Table 1.—*Location and sampling methods utilized during the 1989 Douglas-fir tussock moth early warning survey in southern Idaho.*

Plot	Location			Larval Samples	Cryptic Shelters+		Pheromone Traps	
	T.	R.	Sec.	Date	Date Checked	#	Date Instal.	Date Retrv.
Boise NF								
Bear Creek	4N	10E	7	*	10/11	5	7/19	10/11
Skunk Creek	12N	4E	14	*	10/25	5	7/11	10/25
Payette NF								
Adams Creek	14N	6W	23	*	10/24	5	7/11	10/24
Barinaga Corral	20N	2W	23	*	10/25	5	7/12	10/25
Bear Saddle	15N	5W	31	*	10/24	5	7/11	10/24
E. Fk. Brownlee	16N	4W	3	*	10/24	5	7/11	10/24
Fourbit Creek	13N	2E	7	*	10/24	5	7/12	10/24
McDowell Trail	17N	2W	17	*	10/25	5	7/12	10/25
Olive Creek	17N	2W	7	*	10/25	5	7/12	10/25
Seid Creek	16N	4W	21	*	10/24	5	7/11	10/24
Stacy Creek	14N	6W	14	*	10/24	5	7/11	10/24
Salmon NF								
Colson Creek	23N	16E	12	*	9/26	5	8/08	9/26
Lick Creek	26N	22E	32	*	9/26	5	8/08	9/26
Sawtooth NF								
Little Water Gulch	3N	12E	7	*	10/11	5	7/19	10/11
Virginia Gulch	3N	11E	9	*	10/11	5	7/19	10/11
Idaho State Lands								
Sharps Canyon	2N	19E	36	6/22	10/11	15	8/07	10/11
BLM Lands								
Dewey Peak	6S	4W	3	6/13	10/23	15	7/10	10/23
Mill Creek	8S	5W	12	*	10/23	5	7/10	10/23
New York Summit	4S	3W	32	*	10/23	5	7/10	10/23
So. Fk. Boulder Ck.	8S	5W	24	*	10/23	5	7/10	10/23

+ Pupal shelters are permanent and are repaired or replaced when pheromone traps are installed.
* Not sampled.

RESULTS AND DISCUSSION

The annual mean trap catches for all 20 sites sampled in 1989 and previous years are listed in Table 2. Compared to 1988, the average number of male moths per trap recovered in 1989 generally declined throughout southern Idaho. Trap catches decreased at 11 of the original 20 sites including Sharps Canyon and Dewey Peak, remained relatively static at 3 sites, increased slightly at 5 sites, and increased by more than 25 moths per trap at 1 site. Trap catches continued to exceed the 25-moth threshold at the Dewey Peak site on Bureau of Land Management lands in the Owyhee Mountains for the fourth consecutive year; and, due to a dramatic increase, exceeded this level at the Little Water Gulch site on the Sawtooth National Forest.

Based upon the 1989 catch, intensified trapping should be continued at the Dewey Peak site, discontinued at the Sharps Canyon site, and implemented at the Little Water Gulch Site in 1990. Additionally, in 1990, larval sampling should be conducted at the Little Water Gulch and Dewey Peak sites as 1989 trap catches are either very close to or surpass the 40-moth threshold (Thier 1987).

Table 3 summarizes trap catch information at sites where the two additional sets of traps were deployed in 1989. Trap catches in the additional sets at each site were well below the 25-moth threshold, with the exception of one site near Dewey Peak.

Suboutbreak larval populations were detected at Dewey Peak but not at Sharps Canyon. At the Dewey Peak site, 6 larvae were found on the 10 trees sampled.

The 1989 results of pupal sampling via cryptic shelters are summarized in Table 4. Pupal cases were found at 8 sites which had moth catches ranging from 0 to 36.3 moths per trap. At Dewey Peak, where the trap catch averaged 36.3 moths, 22 viable and 4 nonviable pupae were found. Based on data from all sites, in 1987 and 1989 there seemed to be a direct relationship between total pupal cases and mean moth catch (r^2=.8381 and .5918, respectively) while this relationship did not hold for 1988 (r^2=.0603). More data collection and evaluation are needed to verify this relationship and to improve our ability to quantify populations which can cause visible defoliation.

With the exception of the Dewey Peak site, defoliation caused by Douglas-fir tussock moth is not anticipated in 1990. Even though mean moth catch decreased at the Dewey Peak site (47 moths in 1988; 36.3 moths in 1989), the eight-fold increase in pupae sampled in cryptic shelters (6 pupae in 1988; 49 pupae in 1989) and the high number of egg masses and pupae visible in the lower crown indicate a rising population. Various reports (Shepherd et al. 1988, Moyer 1976, Parker 1973, Forest Pest Management 1981) suggest that Douglas-fir in the Owyhee Mountains have been defoliated every 3 to 5 years. The last outbreak was reported during 1982 to 1983 (Thier and Mocettini 1984). Based on these historic trends and present population levels, defoliation at the Dewey Peak site may occur in 1990. If larval sampling at this site in 1990 again indicates rising populations, lower branch pupal sampling will be done in conjunction with the Integrated Pest Management of Major Pests in Western Forests research unit at the Pacific Northwest Station.

Table 2.—*Summary of male Douglas-fir tussock moths caught in pheromone-baited sticky traps distributed in southern Idaho, 1981 to 1989.*

Plot	Location			Mean Number of Male Douglas-fir Tussock Moths/Trap by Year								
	T.	R.	Sec.	1981	1982	1983	1984	1985	1986	1987	1988	1989
Boise NF												
Bear Creek	4N	10E	7	*	0.0	32.8	0.4	0.0	1.2	1.4	0.6	0.2
Skunk Creek	12N	4E	14	0.2	0.6	29.0	0.0	1.0	1.2	0.2	0.2	0.0
Payette NF												
Adams Creek	14N	6W	23	*	53.6	39.6	7.8	4.0	17.6	8.8	1.8	2.6
Barinaga Corral	20N	2W	23	*	*	44.2	0.4	2.8	4.0	2.0	0.0	1.0
Bear Saddle	15N	5W	31	*	15.2	44.0	1.0	0.2	0.2	0.4	0.0	0.0
E. Fk. Brownlee	16N	4W	3	*	61.2	50.6	2.6	3.4	27.0	6.0	0.2	0.4
Fourbit Creek	13N	2E	7	*	49.8	42.8	*	4.8	30.4	2.0	2.2	1.2
McDowell Trail	17N	2W	17	*	*	35.8	5.0	6.8	24.6	1.2	0.0	0.0
Olive Creek	17N	2W	7	*	36.8	51.2	14.6	10.5	46.8	9.8	3.2	0.5
Seid Creek	16N	4W	21	*	*	17.4	11.2	*	27.2	4.8	1.6	0.4
Stacy Creek	14N	6W	14	*	*	42.8	18.0	8.8	3.8	5.0	0.0	0.4
Salmon NF												
Colson Creek	23N	16E	12	*	15.2	39.0	3.2	*	7.2	5.2	14.0	0.6
Lick Creek	26N	22E	32	*	7.6	38.4	0.6	*	6.0	0.6	28.5	0.6
Sawtooth NF												
Little Water Gulch	3N	12E	7	3.8	13.6	27.0	17.2	0.0	34.6	26.6	4.0	32.5
Virginia Gulch	3N	11E	9	0.6	2.0	26.8	1.8	0.0	4.8	6.8	2.6	0.4
Idaho State Lands												
Sharps Canyon	2N	19E	36	19.4	16.2	41.2	1.3	5.2	22.6	8.4	36.4	9.2
BLM Lands												
Dewey Peak	6S	4W	3	64.0	*	*	15.0	1.6	33.7	38.6	47.0	36.3
Mill Creek	8S	5W	12	47.6	*	*	6.6	0.0	0.4	0.0	0.2	0.2
New York Summit	4S	3W	32	*	*	*	0.0	*	1.8	3.8	15.0	12.6
So. Fk. Boulder Ck.	8S	5W	24	*	*	*	0.7	0.2	1.8	0.2	0.8	2.2

* Not sampled.

Table 3.—*Mean number of male Douglas-fir tussock moths recovered in pheromone traps at the intensified trapping sites in southern Idaho, 1989.*

Plot	Mean No. Moths/Trap Original Site	Extra Set	Extra Set
Idaho State Lands			
Sharps Canyon	9.2	8.0	14.2
BLM Lands			
Dewey Peak	36.3	3.3	27.6

Table 4.—*Numbers of pupal cases by sex recovered in the 20 cryptic shelters located at each sampling site in southern Idaho, 1989.*

Plot	Mean # Moths/Trap	Total No. Pupal Cases Females	Males	Failed
Boise NF				
Bear Creek	0.2	2	0	0
Skunk Creek	0.0	0	0	0
Payette NF				
Adams Creek	2.6	0	3	0
Barinaga Corral	1.0	0	1	0
Bear Saddle	0.0	3	2	0
E. Fk. Brownlee	0.4	2	0	0
Fourbit Creek	1.2	0	0	0
McDowell Trail	0.0	0	0	0
Olive Creek	0.5	0	0	0
Seid Creek	0.4	0	0	0
Stacey Creek	0.4	1	2	0
Salmon NF				
Colson Creek	0.6	0	0	1
Lick Creek	0.6	0	0	0
Sawtooth NF				
Little Water Gulch	32.5	2	2	0
Virginia Gulch	0.4	0	0	0
Idaho State Lands				
Sharps Canyon	9.2	4	0	0
BLM Lands				
Dewey Peak	36.3	3	19	2
Mill Creek	0.2	0	1	0
New York Summit	12.6	1	1	2
So. Fk. Boulder Creek	2.2	0	0	0

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